UNITED STATES CONTINUATION PATENT APPLICATION

ENTITLED:

CIGARETTE WITH INCREASED SELF-EXTINGUISHING TENDENCY

Inventor:
Markus Eibl

This patent application is a Continuation of Application No. PCT/AT02/00126, filed April 24, 2002 which claims priority from Austrian Application No: GM 818/2001, filed October 22, 2001.

CERTIFICATE OF EXPRESS MAILING

I hereby certify that this application (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date shown below and is addressed to: MAIL STOP PATENT APPLICATION, Commissioner for Patents, P.O. Box 1450, Alexandria VA 22313-1450

Express Mail No.: EV303532681US

By: Elaine Fabrizio
Elaine Fabrizio

April 21, 2004
Date

CIGARETTE WITH INCREASED SELF-EXTINGUISHING TENDENCY

FIELD OF THE INVENTION

The invention relates to a cigarette with an increased self-extinguishing tendency, wherein the cigarette paper has annular zones whose porosity is reduced by the presence of a polymer.

BACKGROUND OF THE INVENTION

In recent years, in particular in the USA, there has been an increasing demand that cigarettes which are left lying around unextinguished should not set fire to combustible materials and in this respect in particular textiles (carpets). Although objectively the risk of corresponding accidents is not very high, a series of proposals have been put forward as to the way in which cigarettes are left lying around while burning can be caused to be quickly extinguished.

The proposal disclosed in EP 0 864 259 can be viewed as typical in respect of the state of the art. Here a cellulose polymer in non-aqueous solution is applied to the cigarette paper in the form of rings which are spaced from each other. The paper is of reduced porosity in the region of those rings and the cigarette goes out when burning of the cigarette has progressed as far as that ring. There is a recognised standard for the self-extinguishing tendency of cigarettes, more specifically the NIST test (NIST Technical Note 1436 App. D).

SUMMARY OF THE INVENTION

The object of the invention is on the one hand to satisfy the demands of that test and on the other hand to avoid the disadvantages of the state of the art.

DETAILED DESCRIPTION OF THE INVENTION

They are considered in particular to be that the cellulose derivatives applied to the paper, fillers or highly ground fibres, form at the surface of the cigarette a film, in the region of which the thickness of the coated paper is markedly increased. In comparison the aim is to find a material in which the desired self-extinguishing tendency is not achieved by an external film but by altering the paper structure in the printed region. In itself it was not to be assumed that the actually hydrophobic polymers penetrate into the hydrophilic paper. It is found however that, when the interfacial tension of the polymers used is in the proximity of that of regenerated cellulose, the polymer penetrates into the cavity structure of the paper without a desired film formation occurring at the surface. It is advantageous in that respect if the polar proportion of the interfacial energy is as high as possible. It is therefore essential for the invention that the interfacial tension of the polymer is over 33 mJ/m^2.

Inter alia polyvinyl acetate, partially hydrolysed polyvinyl acetate or polyvinyl alcohol have proven to be particularly suitable. Polyvinyl acetate is polar and its interfacial tension is 36.5 mJ/m^2. Non-polar ethyl cellulose at 32 mJ/m^2 in contrast is as discussed film-forming and cannot be used in accordance with the invention (all figures from: Polymer Data Handbook, 1999, Oxford University Press Inc).

It will be appreciated that it is necessary for the selected polymer to be applied in a sufficient amount and in a condition of suitable geometrical distribution in order to satisfy the criteria of the NIST test. As regards distribution of the bands, a width of more than 4 mm is desirable, even if not critical. It will be appreciated that the bands which stop the cigarette from burning may also not be disposed at excessively great distances, for which reason those distances are preferably below 20 mm.

As regards the applied amount of polymer, simple tests make it possible to establish the values as from which the self-extinguishing tendency is sufficient. In that respect note is to be taken of the surprisingly established fact that a great reduction in porosity still does not automatically result in a substantially improved self-extinguishing

tendency. It is only a further incorporation of material into the paper that leads to an almost abrupt increase in the self-extinguishing tendency. In this connection, attention is directed more specifically to the examples set out hereinafter.

The way in which the polymer is introduced into the paper is not critical, but intaglio printing has proven to be appropriate. By virtue of using intaglio printing the bands have a high level of edge sharpness, and it is not possible to detect a steady increase in the application of material from the edge to the centre. The amount applied is adjusted by virtue of the etching depth, the pattern repeat, the level of concentration and the viscosity of the printing solution.

In order to improve the opacity of the paper, it is possible to use fillers such as aluminium hydroxide, magnesium hydroxide or titanium oxide in the printing solution. Those fillers however have no measurable influence on the self-extinguishing tendency of cigarettes.

The invention is described in greater detail hereinafter by reference to examples.

Example 1

Bands 6 mm in width are printed at a spacing of 19 mm on cigarette paper with an initial porosity of 38 CU by means of intaglio printing with a solution of 35% of polyvinyl acetate in ethyl acetate (discharge viscosity 4 mm = 18 s).

Example 2

Bands 7 mm in width are printed at a spacing of 20 mm on cigarette paper with an initial porosity of 38 CU by means of intaglio printing with a solution of 35% of polyvinyl acetate in ethyl acetate (discharge viscosity 4 mm = 18 s).

Example 3

Bands 6 mm in width are printed at a spacing of 19 mm on cigarette paper with an initial porosity of 38 CU by means of intaglio printing with a solution of 35% of polyvinyl acetate in ethanol (discharge viscosity 4 mm = 20 s).

Example 4

Bands 6 mm in width are printed at a spacing of 19 mm on cigarette paper with an initial porosity of 50 CU by means of intaglio printing with a solution of 35% of polyvinyl acetate in ethyl acetate (discharge viscosity 4 mm = 18 s).

Example 5

Bands 6 mm in width are printed at a spacing of 19 mm on cigarette paper with an initial porosity of 38 CU by means of intaglio printing with a solution of 31% of polyvinyl acetate and 7% of aluminium hydroxide in ethyl acetate (discharge viscosity 4 mm = 21 s).

Example 6

Bands 6 mm in width are printed at a spacing of 15 mm on cigarette paper with an initial porosity of 38 CU by means of intaglio printing with a solution of 23% of polyvinyl acetate in ethyl acetate (discharge viscosity 4 mm = 23 s).

Example 7

Bands 6 mm in width are printed at a spacing of 15 mm on cigarette paper with an initial porosity of 38 CU by means of intaglio printing with a solution of 20% of polyvinyl acetate and 8% of aluminium hydroxide in ethyl acetate (discharge viscosity 4 mm = 25 s).

Results:

The paper is cut into 27 mm wide coils or bobbins. Kingsize filter cigarettes are produced therefrom.

No.	Application mg/cm^2	CU in the band	SE % (NIST))**
Untreated	0	---)*	0
Example 1	0.73	4.3	100
Example 2	0.73	4.4	100
Example 3	0.73	8.1	60
Example 4	0.80	5.5	95
Example 5	0.82	5.0	100
Example 6	0.17	3.2	10
Example 7	0.25	4.8	5

)* paper porosity 39.8 CU

)** Self-extinguishing tendency in accordance with NIST Test App. D.

Examples 6 and 7 confirm the point set out in the opening part of this specification that a reduction in permeability as measured in Coresta Units (CU) still does not guarantee an adequate self-extinguishing tendency. On the contrary the latter is to be measured directly and the application amount is to be increased until the desired result is attained.